

# PS400 Composite Solid Lubricant Plasma Coating

## DATA SHEET

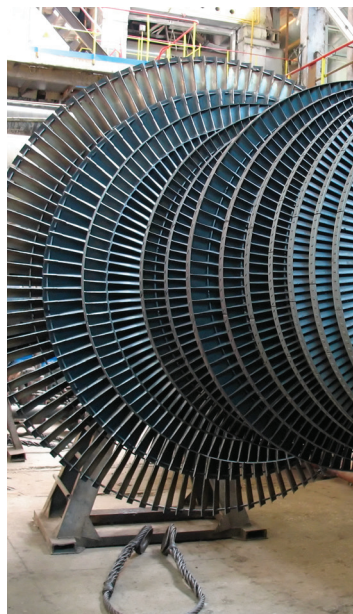
NASA Glenn innovators have developed the most advanced composite solid lubricant plasma coating composed of a nickel-molybdenum-aluminum matrix alloy, for high temperature tribological applications.

### Characteristics:

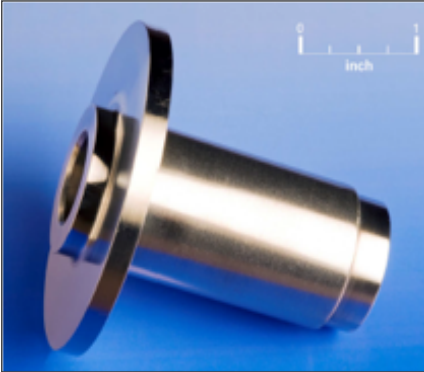
- High speed operation for long duration
- High dimensional stability for high temperature applications
- Strong
- High density
- Smooth surface texture (self-polishing)
- Extreme oxidative stability
- Low friction
- Enhanced creep resistance
- Ideal for low speed sliding contact under moderate loading in extreme environments
- Excellent dimensional stability & surface finish, good tribological properties (after initial break-in)

### Applications:

- Foil air bearings
- Variable geometry inlet guide vane bushings
- Variable inlet guide vanes
- Variable stator vane actuator linkages
- High temperature industrial conveyor chains
- Process control valve stems
- Butterfly valve stems
- Oil-free turbomachinery
- Exhaust Gas Recirculation (EGR) valves
- Waste gate valves for turbochargers
- High-temperature applications where sliding friction and wear are a concern



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## PS400 Coating Composition

PS400 composition	Weight %
Binder	NiMoAl/70%
Hardener	Cr <sub>2</sub> O <sub>3</sub> /20%
Low Temp Lubricant	Ag/5%
High Temp Lubricant	Fluorides (BaF <sub>2</sub> - CaF <sub>2</sub> eutectic)/5%

## Technical Data

Material Properties	Value	Unit
Maximum load (estimated)	10-30	MPa
Operating temperature (min)	Estimated -40	°C
Operating temperature (max)	760	°C
Dry sliding velocity	0-300	m/s
Poisson's ratio	.28	
Young's modulus	83	GPa
Compressive strength (ultimate)	200-250	MPa
Tensile strength	20-24	MPa
Coating thickness	200-400 (250 ideal)	μm
Coating surface roughness	1 or less	μm

## Dry Sliding Performance Data for PS400-coated rods and cobalt bushing

Temp °C	Load (N)	Contact stress (MPa)	PS400 wear (mm <sup>3</sup> /N-m)	Cobalt wear (mm <sup>3</sup> /N-m)	Static coefficient of friction
760	222.4	14.1	9.45 x 10 <sup>-6</sup>	1.79 x 10 <sup>-6</sup>	.43
760	333.6	17.2	1.18 x 10 <sup>-6</sup>	1.02 x 10 <sup>-6</sup>	.40
760	444.8	19.9	1.10 x 10 <sup>-6</sup>	1.03 x 10 <sup>-6</sup>	.37
538	222.4	14.2	3.00 x 10 <sup>-6</sup>	2.34 x 10 <sup>-6</sup>	.41
538	333.6	17.3	3.69 x 10 <sup>-6</sup>	1.43 x 10 <sup>-6</sup>	.40
538	444.8	20.0	3.81 x 10 <sup>-6</sup>	1.01 x 10 <sup>-6</sup>	.36
260	222.4	14.2	1.87 x 10 <sup>-4</sup>	8.25 x 10 <sup>-5</sup>	.82
260 <sup>a</sup>	333.6	17.4	1.23 x 10 <sup>-3</sup>	1.22 x 10 <sup>-4</sup>	.84

Reciprocating speed of 1 Hz (stroke angle 15°) & 50,000 cycles

<sup>a</sup> Test performed for 2 hours